ASSESSING MATHEMATICS SELF-EFFICACY FOR G.C.E (O/L) STUDENTS

M.M. Gamini and P. Sethunga

Department of Education, University of Peradeniya

Introduction

Self-efficacy regulates functioning through four processes: cognitive, motivational, choice and emotional processes (Bandura, 1999). This regulatory role of self-efficacy in the domains of cognitive, behavioral and emotional is measured by assessing cognitive self-efficacy, motivational self-efficacy, behavioral self-efficacy and emotional self-efficacy.

Measurement of academic self-efficacy involves students being administered self-efficacy scale, with ratings of confidence to perform specific tasks in the selected curriculum ."Capabilities assessed and capabilities tested should be the same or similar capabilities" (Pajars, 1996,p.2).

This study examines the nature of domains and related processes of mathematic self-efficacy. The specific objectives of the study were to build up a determinant of mathematics self-efficacy scale. The guidelines to construct scales for assess self-efficacies have been specified by Bandura (2001). These guidelines Highlight the importance of developing self report measures which are task specific and task oriented.

It was considered the major determents cognitive strategies, motivational strategies, self – regulation learning strategies and self resource management strategies.

Method and Materials

A factor analysis study provided empirical evidence of the validity of Determinant of Mathematic self efficacy Scales. A principal component analysis led to the interpretation of a three factor solution and a higher order analysis provided evidence of a unitary structure to the scale (DMSES). Under the descriptive research methodology, quantitative and qualitative methods were used to gather data. The sample consisted of 250 G.C.E (O / L) students from Education Zone Kandy.

The Determinant of Mathematics Self-efficacy Scale (DMSES) contains 81 items which are further categorized into four subscale: cognitive strategies, motivational strategies, self –regulation learning strategies and self-resource management strategies. Each of the items ranging 10 unit intervals from 0 (cannot do), through intermediate degrees of assurance 50 (moderately creation) to complete assurance 100 (highly creation can do) .

The subscales of cognitive strategies consist of 24 items which are subdivided into four categories. Here 6 items were developed based on the rehearsal strategies, 5 items were

developed based on the elaboration strategies, 8 items were developed based on the organization strategies and 5 items were developed based on the comprehension strategies.
The subscales of motivational strategies consist of 15 items which are subdivided into three categories. 7 items were developed based on the intrinsic motivational strategies 4 items were developed based on the extrinsic motivational strategies and 4 items were developed based on the task value and control motivational strategies.

The subscales of self regulation learning strategies consist of 26 items which are subdivide into four categories, 7 items were developed based on the transforming organization strategies and 6 items were developed based on the goal setting and planning strategies and 7 items were developed based on the keeping records and monitoring strategies and 6 items were developed based on the rehearsing and memorizing strategies.
The subscales of self -resource management strategies consist of 16 items which are subdivide into three categories and 6 items were developed based on the meta-cognitive self regulation learning strategies whereas 5 items were developed based on the time and study environment strategies ,and 5 items were developed based on the help seeking strategies.

Results

There were 81 items in the pilot questionnaire. Reliability analyses, and feedback from participants (n = 250) were used to refine the questionnaire. All items which had item total correlation less than 0.60 were dropped. Subscales which had alpha less than 0.70 were also removed. The refined scale was comprised to 72 items.

The internal consistency of the four scale has estimated to be $\alpha = 0.97$ for cognitive strategies $\alpha = 0.97$ for motivational strategies $\alpha = 0.96$ for self–regulation learning strategies $\alpha = 0.98$ for self resource management strategies for the total DMSES was $\alpha = 0.99$

Analysis of the Eigen values, the screen plot, and the principles of simple structure indicated three factor solutions. The factors were rotated and their inter-correlations were calculated.

The three factor solution accounted for 75% of the cumulative variance shows in the Table 1.

The first factor containing 55 of the 72 items, accounted for 27% of the total variance shown in Table 1.

The second factor containing 53 of the 72 items accounted for
24 % of the total variance shown in Table 1.

The third factor, containing 47 of the 72 items accounted for 23% of the variance shown in Table 1.

Table 1: Total Variance Explained

Compone	Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %
1	19.74	27.42	27.42
2	17.58	24.42	51.84
3	16.76	23.28	75.12

Extraction Method: Principal Component Analysis.

Conclusion

Subscales of determents of mathematics self-efficacy scale show high reliability. According to the factor analysis three factors accounted 75% of the variation. The three factors can be categorized as self-efficacy in cognitive and emotional, self-efficacy in cognitive and behavioral and self-efficacy in behavioral and emotional. Findings of this study support Bandura's (1986,1997) claim of

Self-efficacy domains and related processes.

References

Bandura, A. (1986). Social foundations of thought and action: A social cognitive theory. Englewood Cliffs, NJ: Prentice-Hall.

Bandura, A. (2001). "Social cognitive theory: An agentic perspective". Annual Review of Psychology 52: 1–26.

Pajares, F. (1996). Self-efficacy beliefs in academic settings. Review of Educational Research, 66, 543-578.